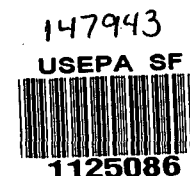


5/19/99 SF/AR
6.9.8

MEMORANDUM

Hanna Stope Reconnaissance Plan

TO: Mary Kay Voytilla/USEPA
COPIES: Bob Hopper/Bunker Hill Mine
Mike Thomas/IDEQ
FROM: Dave Bunte/CH2M HILL
Jim Stefanoff/CH2M HILL
DATE: May 19, 1999



Introduction

This memorandum presents the reconnaissance plan for the Hanna Stope of the Bunker Hill Mine in Kellogg, Idaho. The Hanna Stope is being considered as a potential disposal site for sludge from the mine water treatment plant. Evaluation of this disposal option was identified as a high priority item in the Presumptive Remedy Workshop #2 held on March 2 and 3, 1999 in Spokane, Washington. The purpose, implementation plan, team, coordination and communication issues, health and safety issues, and deliverables associated with Hanna Stope reconnaissance are presented below.

Purpose

Disposal of sludge in the Hanna Stope will require sealing openings to the stope to prevent uncontrolled migration of sludge to other portions of the mine. Management of water that flows into the stope and water from the sludge will be required to prevent:

The buildup of excessive pressure on the sludge containment plugs

Additional contamination of water that mixes with the sludge

Mixing and dilution of the sludge which could lead to significant increases in the sludge volume for disposal

Seepage/instability within the mine as a result of altered drainage paths

Two one-day preliminary reconnaissance trips were previously made to the Hanna Stope to collect basic information regarding the configuration and size of the stope. Additional information is needed for the following:

Confirm potential locations for plugging the lower portions of the stope for sludge containment.

Evaluate the method for plugging and the stress conditions under which the plugs must function.

Determine sources and approximate quantity of water flow into the stope for potential control or diversion of influent water

Develop an approach for containment and removal of water that accumulates in the stope.

Determine requirements for cleanup and rehabilitation of the Russell Tunnel

This information will be used to evaluate the feasibility of sludge disposal in the Hanna Stope. If this

option is determined to be feasible, the information from the reconnaissance will be used to develop a conceptual design of the sludge containment system.

Preliminary information was obtained in previous reconnaissance regarding potential locations for installing plugs for sludge containment. A more detailed evaluation of the geometry and interconnection of the mine workings and observations at the potential plug locations is needed. An understanding of the connections from the Hanna Stope to other mine workings needs to be developed. These connections could include major openings such as drifts and raises as well as small connections such as drill holes. Additionally, other natural connections such as faults and fractures that could result in water inflows and/or sludge leakage would need to be identified.

There may be the potential to divert water that flows into the Hanna Stope. If water can be diverted, this would reduce the volume of water that must be handled by the stope dewatering system.

The ability to construct a water handling system that can prevent the buildup of excess water on the sludge will be key to the viability of this sludge disposal option. Construction of a dewatering system directly in the bottom of the large open Hanna Stope may be difficult because of uncertain stability of overhanging rock. The dewatering system may need to be constructed in more protective areas such as in drifts or raises that are in close proximity to the Hanna Stope. The feasibility of constructing such a system must be evaluated.

The access to the Hanna Stope via the Russell Tunnel must be evaluated. There are caved areas in the Russell Tunnel that would need to be cleared to obtain sufficient access to the Hanna Stope for both construction and operation. The rehabilitation requirements for this tunnel will also be evaluated during site reconnaissance.

Implementation Plan

The reconnaissance will be conducted during the spring when there are higher water flows in the mine to obtain a more complete assessment of the existing water flow routing in the mine. The reconnaissance will be conducted by accessing the Hanna Stope via the service raise in Upper Milo Creek, or via the Cherry Raise. The service raise is the only access to the stope areas above 5 Level. The Cherry Raise can provide access to 5 and 6 Levels.

From the service raise, the reconnaissance team will work its way down to 5 Level and 6 Level. While traveling down, the team will observe water flows at each sublevel to determine where water is flowing into the Hanna Stope. Estimates of water flow rates will be determined. Flows will be estimated visually or, where possible, measured with a small cutthroat flume or bucket and stopwatch. Analytical samples will be collected from selected flows and could be tested for total and/or dissolved metals, lime demand/solids formed, acidity, and total suspended solids as appropriate. Field tests consisting of pH, conductivity, and temperature will also be conducted on selected flows as appropriate.

The mine workings between 5 and 6 level near the Hanna Stope will be reviewed to determine if they can be used as part of a dewatering system. The physical arrangement of these workings and interconnection with the Hanna Stope will be determined where possible.

A review of potential locations for installing plugs on 6 level will be made. Locations where a minimum number of plugs can be placed to contain the sludge will be determined. The potential locations will be evaluated for suitability for plug installation.

A Brunton compass will be used to determine orientation and inclination of raises and transfer chutes

that are conduits for flow. Dimensions of the stope and workings will be determined using a laser range finder. This information will be used to establish 3-dimensional orientations of structures and other locations on levels, and connections between levels. Bright portable lights may also be used to help illuminate larger areas.

Reconnaissance Team and Schedule

The reconnaissance team is expected to consist of the following people. Alternative team members include Jim Stefanoff and Matt Germon.

Bill Hudson, Recon lead, mining geologist, and site safety coordinator for CH2M HILL staff
John Riley, Hydrogeologist
Ken Green, CH2M HILL Senior Civil/Geotechnical Engineer
Jay Dehner, CH2M HILL Geotechnical Engineer
Dave Bunte, CH2M HILL Mining Engineer, and overall technical lead
Travis Pyle, CH2M HILL Civil Engineer
Nick Zilka, IDEQ

The reconnaissance is anticipated to be conducted in one three-day reconnaissance effort and one two-day trip to follow up on questions that arise during the evaluation of the results from the first trip. Additional trips may be required. The reconnaissance should be conducted during the spring when the mine water flows are higher.

Reconnaissance Coordination and Communication

The majority of reconnaissance activities will require close coordination with Bob Hopper of the Bunker Hill Mine. Entrance dates and times, exit times, and access issues will need to be clarified with Bob prior to conducting any mine reconnaissance.

Health and Safety Issues

Appropriate safety precautions will be taken while underground in the Bunker Hill Mine. All underground trips will include a check-in and checkout with Bob Hopper. Appropriate safety equipment and restraint techniques will be utilized when using existing raises and ladders for inter-level access, if necessary. MSHA will be notified of the recon prior to it occurring and given the opportunity to participate.

Bill Hudson will serve as the Site Safety Coordinator (SSC) under the CH2M HILL Health and Safety Plan (HSP). Appropriate safety briefings will be held at the start of work, and all people entering the mine will be under SSC supervision and will sign the HSP.

Deliverables

Brief one-page write-ups will be forwarded to Bob Hopper and Jim Stefanoff of CH2M HILL at the completion of each recon day, or as necessary. The write-ups will discuss important findings relative to the reconnaissance objectives and will use the same format as the Flood-Stanly Ore Body recon write-ups (example format attached). A copy of field notes and any available marked-up maps or sketches will be attached to the write-ups. A recon report will also be prepared which summarizes

the findings.

HANNA STOPE RECONNAISSANCE LOG

TO:

FROM:

RECON LEVEL(S):

RECON DATE:

RECON TEAM:

ACCESS POINT AND
ROUTES:

OBSERVATIONS:
(attach map)

WATER
QUALITY/FLOW
ENCOUNTERED:

COMMENTS/
RECOMMENDATION
S: